CONFIDENTIAL

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Superfund Response Action Priority Form

Regional Site Priority: High Region: 10

Site Name: McCormick & Baxter Creosteing

CERCLIS ID: ORD009020603 NPL Status: Final

Site Location

City Portland County Multnomah

State Oregon Cong. District _____

Action

X Remedial, or OU#: 3 - Final Groundwater

__ Time Critical Removal (NPL/Non-NPL)

__ Non-Time Critical Removal (NPL/Non-NPL): _____)

If non-NPL, date of proposal to NPL/date of final to NPL

First, Subsequent, or Final Action for site: _____

If final action, will this result in construction completion for site (Yes/No)?_____

Site Description (size, volume of waste, current and future land use of the site and land adjacent to the site, etc.):

The McCormick and Baxter Creosoting Company, Portland Plant site (McCormick & Baxter or site) covers approximately 58 acres of terrestrial and aquatic land and is located on the east bank of the Willamette River in Portland, Oregon. The site is located in an area that was constructed using dredged material in the early 1900s. The site consists of approximately 43 acres on land and 15 acres in the river. It is generally flat. The site is bordered by industrial properties to the south, the Willamette River to the west, Burlington Northern Sante Fe Railroad tracks to the north, and Union Pacific Railroad tracks and a residential area on top of the bluff to the east. Land use at the site has been industrial since the 1940s and it has been projected to continue as industrial, or perhaps recreational, in the future. The City of Portland is conducting a site reuse assessment under EPA's Superfund Redevelopment Pilot Initiative. There are established railroad right-of-ways on two sides of the site, and it is anticipated that the area on top of the bluff will remain residential.

Three main contaminant source areas exist at the site: the former waste disposal area, the central process area, and the tank farm area. These areas are described below.

- The former waste disposal area is located at the western corner of the site adjacent

to the Willamette River. This area is characterized by a large depression where waste oils, retort sludges, and wastewater were disposed over a period of several years. Based on historical aerial photographs, this former waste disposal area could have been as large as 0.4 acres.

- The central process area is the present or former location of the retorts, pentachlorophenol (PCP) mixing shed, and ammoniacal copper zinc arsenate (ACZA) storage areas.

- The tank farm area is located in the central area of the site and is the former location of the main tank farm, the large creosote tank, and several other wood treatment process-related tanks or process areas.

Other source areas include the southeast disposal trench area, located southeast of the tank farm area, which received overflow of oily wastes from the system pits and tank farm; miscellaneous small waste disposal areas.

Contaminants on the site are chemicals used in the wood preserving industry, including polycyclic aromatic hydrocarbons (PAHs, comprising about 85 percent of creosote constituents), PCP, arsenic, chromium, copper, and zinc. Polychlorinated dibenzo-*p*-dioxins and dibenzofurans (dioxins/furans), which are trace constituents of PCP, were also found in soil, groundwater, and sediment at the site.

All contaminants were found in concentrations that exceed natural background levels by substantial margins; maximum values of PAHs, PCP, dioxins/furans and arsenic exceeded background levels by factors of more than 1,000. Many contaminants are considered human carcinogens, and many are also toxicants. Copper and zinc, while relatively nontoxic to humans, are toxic to aquatic organisms.

As with soil, the main contaminants in groundwater are PAHs, PCP, and heavy metals associated with wood treating solutions. Releases of NAPL contaminants from the main source areas at the site, in particular the tank farm area and the former waste disposal area, have primarily affected the shallow aquifer. As the pure-phase NAPL has migrated toward the river, it has also spread downward vertically, affecting a layer of sand adjacent to the river. Two distinct NAPL plumes are present at the site, one in the tank farm area and the other in the former waste disposal area. Smaller NAPL plumes are present near MW-1 and the former location of Butt Tank 1 in the northeast corner of the site. The tank farm area and the former waste disposal area plumes show that free-phase LNAPL and DNAPL are present. Monitoring and extraction wells have contained up to 8 feet of LNAPL and 21 feet of DNAPL, with visible DNAPL present in soil samples collected at depths up to 88 feet bgs.

Dissolved-phase organic (primarily PAHs) and inorganic (primarily arsenic, chromium, copper, and zinc) contaminants are also present in groundwater. Shallow monitoring wells within NAPL plume areas contain total PAH concentrations in the range of 2,000 to 920,000 micrograms per liter (μg/L), but are generally in the range of 10,000 to 100,000 μg/L. Intermediate zone wells

within the two source areas exhibit a range of contaminant concentrations of total PAHs and PCP similar to shallow wells. Deep zone wells do not regularly contain detectable concentrations of PAHs or PCP.

NAPL plumes have migrated downgradient with groundwater and contaminated beach and Williamette River sediments. Thus groundwater contamination is a source of river sediment contamination.

Response Action Summary (Include past response actions and response actions still required):

Note: The following discussion pertains to groundwater response actions only.

Interim remedial actions conducted by DEQ include:

- Installation of an interceptor trench downgradient of the tank farm area to recover light nonaqueous-phase liquid (LNAPL);
- Installation and monitoring of 21 new wells to further delineate the extent of NAPL contamination;
- Recovery of NAPL from monitoring and extraction wells; and
- Design, construction, and operation of a pilot treatment system to treat NAPL-contaminated groundwater.

The Record of Decision for the site was issued in 1996. The selected remedial actions focus on recovering contaminants, reducing toxicity, mobility, or volume through treatment, and providing cost-effective and readily implementable means of protecting human health and the environment. The selected groundwater remedy includes enhancement of the existing groundwater and NAPL extraction and treatment system currently being operated at the site. The remedy will remove NAPL and will hydraulically control contaminated groundwater in a limited area in the immediate vicinity of the extraction wells.

The selected groundwater cleanup alternative includes the following components, with their current operational status in parentheses :

- Enhanced NAPL recovery using pure-phase extraction and/or groundwater/NAPL extraction (On-going);
- Evaluation by pilot testing of innovative technologies, such as surfactant flushing, to increase the effectiveness and the rate of NAPL removal (still required);
- Treatment of groundwater using methods such as dissolved air floatation, filtration, carbon absorption, extended aeration/packed bed bioreactor, or other

biological treatment (Ongoing);

- Discharge of treated groundwater to the Willamette River in accordance with substantive NPDES requirements, or alternatively discharge to drainfields installed in major source areas for enhanced NAPL recovery if pilot testing is successful (Ongoing);

- Off-site treatment and/or disposal of NAPL and other treatment residuals in accordance with applicable hazardous waste regulations (Ongoing);

- Monitoring to ensure that site-specific ACLs are met at compliance monitoring locations (Ongoing);

- A contingency to install a vertical physical barrier in the event that the mobile NAPL cannot be reliably controlled using hydraulic methods, or it improves the overall cost-effectiveness of the groundwater remedy (still required);

- Institutional controls restricting groundwater use at the site (still required)

The response action which is the subject of this funding request is construction of the vertical physical barrier wall.

Planned Total Obligations: $ 4 million for Final Groundwater (OU#3)

Planned FY 2001 Needs (If large dollar project please provide a quarterly forecast):
$ 3 million FY 2001/4

Readiness Criteria:

Date State Superfund Contract or State Cooperative Agreement will be signed (Month)? Signed in May 1996 and amended in August 1997 .

If non-time critical, is State cost sharing (Provide details)?

For removals that require post-removal site control(PRSC), are assurances in place?
Who will assume responsibility for PRSC:
State/local_____ PRP_____ Remedial program_____

If Remedial Action when will Remedial Design be 95% complete (Month)? August 2001

When will Region be able to obligate money to the site? May 2001

Estimate when on-site construction activities will begin ? September-October 2001

I. Principle Contaminants
(Please provide average and high concentrations)

CONTAMINANT CONCENTRATIONS IN GROUNDWATER		
	Range (µg/L)	
Compound	Minimum	Maximum
Naphthalene	1.0 U	2,400,000
Acenaphthylene	1.0 U	150,000
Acenaphthene	1.0 U	2,000,000
Fluorene	1.0 U	1,800,000
Phenanthrene	1.0 U	3,900,000
Anthracene	1.0 U	620,000
Fluoranthene	1.0 U	2,000,000
Pyrene	1.0 U	1,100,000
Benz[a]anthracene	1.0 U	240,000
Chrysene	1.0 U	190,000
Total benzofluoranthenes [b+k]	1.0 U	160,000
Benzo[a]pyrene	1.0 U	100,000
Benzo[e]pyrene	1.0 U	5,300
Idenol[1,2,3-cd]pyrene	1.0 U	52,000
Dibenz[a,h]anthracene	1.0 U	17,000
Benzo[ghi]perylene	1.0 U	20,000
2,3,4,5-Tetrachlorophenol	1.0 U	190 E
2,3,4,6-Tetrachlorophenol	1.0 U	170 E
Pentachlorophenol	5.0 U	1,200,000
Dioxins/Furans (TEC)	4.6×10^{-3} L	2.0×10^{-1} L
Arsenic	1.0 U	9,000
Chromium	2.0 U	12,000
$Chromium^{6+}$	2.0 U	120
Copper	3.6	5,400
Zinc	8.4	260,000

Qualifiers:

E	- estimated value
L	- actual value is probably less than reported value
U	- undetected at detection limit shown

II. Site/Contaminant Stability Describe the means/likelihood that contamination could impact other areas/media given current containment:

Groundwater at the site is not currently contained. Groundwater flow is influenced by the tidal stage of the adjacent Willamette River, but normally is towards the river. Hydraulic control of the NAPL plumes has not been able to be achieved through the NAPL extraction well system. It is highly likely that NAPL plumes will continue to migrate towards the river and continue to contaminate the river sediments. Beach seeps of NAPL are observed during low river water levels, typically in the fall season.

The 1996 ROD selected capping as the remedy for contaminated river sediments (OU#4). The state and EPA are proceeding towards implementing the sediment cap. However, control of the NAPL plumes in groundwater must first be accomplished, to reduce the likelihood for recontamination of the sediments and possible permeation of the cap. Therefore the vertical barrier wall contingent remedy needs to implemented at this time.

III. Summarize Human Exposures/Risks Describe the Exposure Scenario(s) driving the risk and remedy (Include: current/future, on-site/off-site, media, exposure route, receptor):

Note: The following discussion pertains to risks associated with exposure to groundwater and sediment. Sediment is included here because groundwater contamination, especially movement of NAPL plumes, is responsible for the contamination of river sediments.

Elements of the human health risk assessment include identification of contaminants of concern, exposure assessment, toxicity assessment, risk characterization, and uncertainty assessment. Human populations that could potentially be exposed to site contamination include future site occupants, trespassers to the site and beachfront, recreational anglers and their families. The site is currently zoned for heavy industrial use under the Portland Comprehensive Plan. Because future land use at the site could change over time, future commercial/industrial, recreational, and residential uses also were evaluated.

The primary pathways for exposure to site contaminants include:

- Incidental ingestion of and dermal contact with contaminated sediment related to recreational uses of the beachfront;
- Consumption of fish and crayfish caught by recreational anglers in the area of contaminated sediment;

- Inhalation of fugitive dust (i.e., contaminated particulates) by future on-site residents or workers and current and future on-site visitors, beach visitors, or recreational anglers; and

- Exposure to groundwater under a hypothetical use of groundwater as a drinking water supply.

The human health risk assessment did not identify inhalation of fugitive dust by nearby residential communities as a exposure pathway of concern based on air modeling results for fugitive dust emissions from the site.

Quantitation of exposure for each of the exposure scenarios was performed in accordance with Region 10 and federal EPA risk assessment guidance. Chemical intake estimates were based on reasonable maximum exposure parameters and exposure point concentrations (e.g., 95 percent upper confidence limit (UCL) on the arithmetic mean). The exposure pathway for dermal contact for the recreational exposure scenario assumes use of the beach for 3 days per week for 3 months of the year.

Toxicity factors used for the toxicity assessment were obtained from EPA Integrated Risk Information System (IRIS) and/or EPA Health Effects Summary Tables (HEAST).

Most of the contaminants of concern are either known or probable human carcinogens. Cancers related to PAH exposures include stomach and respiratory tract. Cancers associated with chlorinated phenols, dioxins/furans, and hexachlorobenzene include leukemia, liver, and other organs. Arsenic and chromium are known to cause cancer to the lung through inhalation. Arsenic has also been shown to cause skin cancer from ingestion.

Noncancer effects associated with exposure to PAHs and chlorinated phenols are primarily related to toxicity of the kidney and liver. Effects associated with exposures to arsenic and chromium include keratosis and atrophy of the nasal mucosa.

The results of the risk characterization were compared to acceptable risk levels cited in the NCP (40 CFR Part 300.430(e)(2)(i)(A)). The NCP states that cancer risk levels in the range of 1×10^{-6} to 1×10^{-4} (1 in 1,000,000 to 1 in 10,000) and lower are within the range of acceptable risks for Superfund sites. Similarly, noncancer hazard quotients less than 1 are not expected to result in adverse health effects.

Risks were calculated for three potential future uses of the site; recreational, industrial, and residential. Risks are highest for future residents, followed by future site workers and then recreational users.

As shown in Table 6-1, carcinogenic PAHs and dioxins/furans represent the greatest percentage of the excess lifetime cancer risk posed by the site. All potential future uses of the site (recreational, commercial/industrial and residential) were associated with significant human health risks (greater than 1×10^{-4} excess cancer risk) assuming no removal/remediation of

surface soil. The risks summarized in Table 6-1 represent conditions at the site before DEQ conducted interim remedial actions. Interim remedial actions mitigated some of the risks, but current risks still warrant a cleanup at the site.

TABLE 6-1
SUMMARY OF EXCESS CANCER RISK ESTIMATES CALCULATED FOR KEY CONTAMINANTS OF CONCERN

Exposure Scenario	Total Excess Cancer Risk by Chemical of Concern[a]				
	CPAH	**PCP**	**Dioxins/ Furans**	**Arsenic**	**Scenario Total**
ONSITE MEDIA					
Exposure to Groundwater[c]					
Future Worker	$5x10^{-2}$	$2x10^{-3}$	$2x10^{-3}$	$1x10^{-3}$	$6x10^{-2}$
Future Resident	$2x10^{-1}$	$8x10^{-3}$	$8x10^{-3}$	$3x10^{-3}$	$2x10^{-1}$
OFFSITE MEDIA					
Recreational Exposure to Sediments[d]	$5x10^{-5}$	$3x10^{-8}$	$1x10^{-4}$	$7x10^{-7}$	$2x10^{-4}$
Consumption of fish/crayfish	--	--	$1x10^{-4}$	$1x10^{-5}$	$1x10^{-4}$
OFFSITE TOTAL:	$5x10^{-5}$	$3x10^{-8}$	$2x10^{-4}$	$1x10^{-5}$	$3x10^{-4}$

Note:
CPAH - carcinogenic polycyclic aromatic hydrocarbons
Dioxins/Furans - polychlorinated dibenzo-p-dioxins and furans
PCP - pentachlorophenol
HCB - hexachlorobenzene
TEC - Toxicity Equivalent Concentration
-- - not evaluated because contaminant was either not analyzed for or not detected.

Excess lifetime cancer risk estimates for groundwater (Table 6-1) exceeded the 1×10^{-4} risk level for all groups of wells. The contaminants responsible for these risk estimates were carcinogenic PAHs, PCP, dioxins/furans, hexachlorobenzene, and arsenic.

A hazard quotient exceeding 1 indicates a potential for noncarcinogenic health effects from site contaminants. The hazard quotient for the recreational scenarios involving beach visitors and recreational fishing had hazard quotients of 2 related to dermal exposure to contaminated sediment.

Hazard indices for groundwater exceeded 1 for the source area (HI = 300) and downgradient wells (HI = 40). The contaminants responsible for these risk estimates included noncarcinogenic PAHs, pentachlorophenol, hexachlorobenzene, and arsenic.

Estimate the number of people reasonably anticipated to be exposed in the absence of any future EPA action for each medium for the following time frames:

Medium	**< 2yrs.**	**< 10 yrs.**	**> 10 yrs.**
Sediment	25	50	100+

Discuss the likelihood that the above exposures will occur?

Exposure of future workers at the site to groundwater and sediments is highly likely to occur as a result of ongoing security and remediation activities. In addition redevelopment activities have a high degree of occurring, now that the off-site removal phase of the soil operable unit remedy has been completed (1999). Short-term redevelopment could include passive recreation uses such as pedestrian and bicycle trails, open space, and demonstration gardens.

Exposure of anglers and recreational boaters to contaminated sediments and the beach area is likely not to occur except rarely, in the absence of remedial action. Through past notices and posting of warning signs, boaters and anglers are warned to avoid the site beach area and sediments.

IV. Explain any Ecological Risks/Impacts Describe any observed or predicted adverse impacts on ecological receptors including their ecological significance and likelihood of occurring, size of the impacted area.

Note: The following discussion pertains to risks associated with exposure to groundwater and sediment. Sediment is included here because groundwater contamination, especially movement of NAPL plumes, is responsible for the contamination of river sediments.

The objectives of the ecological risk assessment were to assess qualitatively and quantitatively the potential adverse ecological effects associated with contaminants detected at the site in the absence of remedial action. The focus of the assessment was to assess risk to fish and aquatic invertebrates associated with river sediment contaminated primarily by creosote and other chemicals that were used in wood treating activities by McCormick & Baxter. River sediment has become contaminated from migration of groundwater and NAPL plumes originating on the site. Analyses of sediment chemistry, sediment bioassays, bioaccumulation (tissue residues) in fish and crayfish, fish histopathology, and wildlife observations were evaluated to identify areas of the site that potentially pose an ecological hazard.

The river habitat near the site includes crayfish, clams, and numerous fish species, although the shoreline upstream and on the opposite bank of the Willamette River are highly industrialized.

Shorebirds observed in the vicinity of the site include great blue herons, cormorants, Canada geese, ducks, and gulls. Mammals known to be present in the vicinity of the site that may come into contact with contaminated sediment include racoons, beavers, and otters, as well as numerous other species.

The primary exposure pathways for the aquatic environment include contact with contaminated sediment, interstitial pore water, and the water column. Major exposure routes for aquatic receptors include dermal exposure, exposure through respiratory structures and ingestion, as well as exposures through ingestion of contaminated prey by higher trophic level species such as predatory fish, fish-eating birds, and small mammals such as the racoon.

Exposure point concentrations were evaluated through analyses of sediment and soil samples collected at the site. Sediment is primarily contaminated with PAH compounds associated with creosote; PCP contamination of sediment was infrequently detected at low concentrations. Limited arsenic and dioxins/furans contamination also was detected at concentrations exceeding background by a factor of 10 and 2, respectively. Chromium, copper, and zinc were within the range of background concentrations upstream of the site.

The toxicity assessment included a quantitative and qualitative analysis of available toxicity data to identify what potential toxicological effects might be expected based on-site conditions. Data evaluated included acute and chronic water quality criteria, 50 percent lethal concentration values, sediment quality benchmarks, and mammalian and avian toxicity profiles.

Hyalella azteca and Microtox™ bioassays were performed on 48 and 17 sediment sample locations, respectively, to assess contaminated sediment toxicity to benthic invertebrates. Histopathological studies were conducted on the large scale sucker. The frequency of liver lesions in this fish species is an indicator of carcinogens in the environment and potential adverse effects in aquatic biota. Chemical analysis of fish and crayfish tissue was also performed to evaluate foodchain exposures by predator species.

The bioassay results indicated that a substantial area of river sediment is likely to be toxic to benthic organisms. The area of significant toxicity is confined to the shoreline near the site and the creosote dock, and in the immediate vicinity of the Burlington Northern Railroad bridge. The toxicity of sediment and surface soil at the site to other types of wildlife has not been quantified or directly studied, though wading shore birds, raccoons, beavers, ground squirrels, and burrowing mice are considered to be at the greatest potential risk.

Based on bioaccumulation and histopathological studies of the site, risks to fish and shellfish near the site are generally low, although seeps of oily material may present acute risks to individual organisms.

Would natural recovery occur if no action was taken? Unlikely to occur within a reasonable time period.

If so, estimate how long this would take. _____

V. Programmatic Considerations

Describe the degree to which the community accepts the response action:

There is strong community support for the overall site remediation. Most of the surrounding community's concerns have concerned contaminated soil and abandoned buildings on the site and the desire to have the site returned to a productive reuse. Previously completed response actions have addressed these concerns–contaminated soil has been removed from the site, and buildings demolished. There has been little community interest in groundwater cleanup *per se*, likely because the contaminated groundwater does not affect any potential drinking water supplies or users.

The community has expressed a strong desire for the contaminated sediment to be capped, and EPA and the Oregon DEQ are proceeding now to implement the design of this component of the site remedy. However, the agencies believe it is important to first implement the groundwater barrier wall element of the groundwater remedy and put into place a mechanism to control movement of mobile NAPL, to ensure that the sediment cap does not become contaminated from NAPL seeps. Since groundwater contamination has been the main source of sediment contamination, the community's support for remediating the sediments translates to support for the groundwater response action.

Describe the degree to which the state accepts the response action:

The state is the lead agency managing all cleanup actions at the site. The state conducted the RIFS for the site and chose the selected remedy, with EPA's concurrence. Obviously, the groundwater response actions taken already and planned to be conducted are strongly supported by the state.

Describe other programmatic considerations, e.g.; natural resource damage claim pending, Brownfields site, uses an innovative technology, construction completion, economic redevelopment, environmental justice , etc:

The site has been identified by EPA as a Pilot Project under the Superfund Redevelopment Initiative. The City of Portland is conducting a reuse assessment of the site with EPA funding from the pilot project. It appears that a consensus among all local stakeholders is emerging for the future short-term reuse of the site. This is likely to put pressure on EPA and DEQ to move forward with the remaining uncompleted portions of the site remedy–the soil cap, groundwater barrier wall, and sediment cap. The site has significant redevelopment potential because of its size, proximity to adjacent industrial activities and access by rail and water.